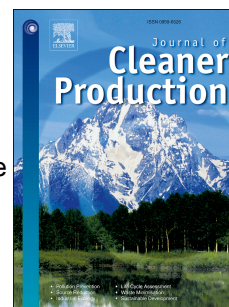


Accepted Manuscript

Ecological Empowerment and Enterprise Zones: Pain Free Transitions to Sustainable Production in Cities or Fool's Gold?

Philip Monaghan, Peter North, Alan Southern



PII: S0959-6526(16)30073-7

DOI: [10.1016/j.jclepro.2016.03.013](https://doi.org/10.1016/j.jclepro.2016.03.013)

Reference: JCLP 6862

To appear in: *Journal of Cleaner Production*

Received Date: 1 May 2015

Revised Date: 1 March 2016

Accepted Date: 2 March 2016

Please cite this article as: Monaghan P, North P, Southern A, Ecological Empowerment and Enterprise Zones: Pain Free Transitions to Sustainable Production in Cities or Fool's Gold?, *Journal of Cleaner Production* (2016), doi: 10.1016/j.jclepro.2016.03.013.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Ecological Empowerment and Enterprise Zones:

Pain Free Transitions to Sustainable Production in Cities or Fool's Gold?

Philip Monaghan, Peter North, and Alan Southern

University of Liverpool, Department of Geography and Planning /
Management School, Liverpool L69 8TZ, monagp@liverpool.ac.uk

Abstract

An Enterprise Zone (EZ) based on cleaner production is an increasingly popular government policy to accelerate the sustainable cities agenda. The purpose of this review paper is to critique EZ theory and the credibility of policy transfer to sustainable production in cities. To this end we undertook a literature review on EZ theory; produced a survey of cleaner production EZs to highlight its application in England; and developed a conceptual framework for a triple bottom line form of EZ. Based on our findings we argue that for the credible transfer of EZ theory to the sustainable cities agenda, policy should align to our conceptual framework for an Ecological Empowerment and Enterprise Zone (EEEZ). The EEEZ is an EZ which is ecologically restorative, places an emphasis on community involvement to better harness market forces, and understands the utility of state with the public sector as an entrepreneur. These research results will be of value to the literature focused on spatial low carbon enterprise strategy.

Highlights:

- Our survey results suggest that cleaner production EZs are a common phenomenon: in England four fifths of the 24 EZs in operation have an explicit interest. Examples include Sunderland's low carbon vehicle corridor and Hull's green port with offshore energy.
- However, our typology to analyse EZs also indicates they display different sustainable characteristics: i) advanced standards for control of material throughputs during planning or operation; ii) manufacture and export of low

carbon technologies; and iii) steady state transition through ecological regeneration and community capacity building.

Key words: Sustainable cities; Industrial strategy; Deregulatory incentives

Abbreviations

ABI	Area Based Initiative
BREEAM	Building Research Establishment Environmental Assessment Methodology
EEEZ	Ecological Empowerment and Enterprise Zone
EIP	Eco-Industrial Park
EZ	Enterprise Zone
GDP	Gross Domestic Product
GHG	Greenhouse Gas
Ha	Hectares
ILO	International Labour Organization
LEP	Local Enterprise Partnership
SSE	Steady State Economy
UDC	Urban Development Corporation

Word count: 9,569 (excluding abstract and bibliography)

1. Introduction

This paper argues that government initiatives to adopt a new and cleaner production form of Enterprise Zone (EZ) policy to aid the transition to sustainable cities unnecessarily run the risk of failure if policymakers do not heed lessons from the performance of previous forms of EZ policy and adopt a more holistic and triple bottom line approach to sustainable production.

There is no universally accepted definition of an EZ, reflective of the diverse nomenclature, purpose and application of this economic instrument. It is one form of Area Based Initiative (ABI), the objective of which takes many types: community empowerment, foreign direct investment, deregulation, or a spur to innovate and experiment. According to Squires and Hall (2013: 81) an EZ is 'a policy of deploying spatially targeted fiscal incentives to promote regeneration'. By comparison, Farole and Akinci (2011: 3) describe an EZ as:

"demarcated geographic areas contained within a country's national boundaries where the rules of business are different from those that prevail in the national territory. These differential rules principally deal with investment conditions, international trade and customs, taxation, and the regulatory environment; whereby the zone is given a business environment that is intended to be more liberal from a policy perspective and more effective from an administrative perspective than that of the national territory".

The EZ is usually one part of an overall economic reform strategy for creating jobs, diversifying exports and enhancing the competitiveness of manufacturers or service providers in a particular place. Enthusiasts for EZs argue that they are intended to counter local land or market failure by realising agglomeration benefits from concentrating industries in one geographical area (e.g. efficiencies from more effective government support for and supervision of enterprises, provision of off-site infrastructure, improved environmental controls, and increased supply and sub-contracting relationships among industries). The EZ or an ABI with similar spatially targeted enterprise

characteristics to those outlined above may be called by another name, including: Special Enterprise Zone, Free Enterprise Zone, Export Processing Zone, Accelerated Development Zone, Empowerment Zone, Special Economic Area, Business Improvement District, Innovation Cluster/Hub/Centre, or Industrial Park (Farole and Akinci, 2011; Squires and Hall, 2013; Monaghan, 2013). In their current, *laissez-faire* form, in England they are strongly rooted in the rejection of the radical local socialism strategies of the urban left in the 1980s especially which, deregulatory advocates argued, ‘put off’ business (Robson, 1998). In this context, EZs first manifested themselves in the form of the Urban Development Corporations (UDC). More widely, as we show below, EZs are a fundamental component of entrepreneurial, as opposed to managerial, conceptions of urbanism (Harvey, 1989). This is an important distinction as it grounds the concept in the wider ‘state-business-society’ discussion.

While their contemporary manifestation is strongly rooted in deregulatory conceptions of urbanism in terms of being spaces where regulations are consciously relaxed, the case for policies to encourage enterprises to locate in a specific area are strongly grounded in economic theory more widely, both orthodox and new. This ranges from the attraction in economic geography to the strategic benefits from being a location of choice, attempts to address uneven regional development and rebalance the economy, through its application as a deregulated, market-based solution to insufficient levels of utility or wealth by the removal of what was perceived to be “the dead hand of bureaucracy” (Taylor, 1981: 421), to a type of ecological economics which is framed by the need to adapt to climate change and value resource scarcity by decoupling growth from the use of fossil fuels (Wang et al, 2010). EZ policy (broadly conceived) assumes that several conditions hold true (Greenbaum and Engberg, 2004), namely that: i) economic barriers such as poor access to capital, skilled labour or transport cause an area’s lack of economic activity; ii) public officials can identify the right EZ incentives to overcome these economic barriers by encouraging businesses to locate in these spaces (and this may or may not include deregulation, it might include other incentives); and iii) that EZs increase overall growth.

The cleaner production EZ is intended to be different from other forms of EZ and wider ABI, in particular because it does not necessarily deplete local natural assets or rely on deregulatory incentives which diminish social standards, and is sympathetic to the utility of the activist state. In order to determine the contribution of a new and cleaner production form of EZ policy to sustainable cities, it is useful to understand the evolution of EZ theory through multiple iterations, informed by different conceptions of political economy. After this introduction, the second section sets out the methodology for this research. The third section investigates the origins of EZ policy. The aim is to understand how it first emerged, and why it is being adapted to be applied to sustainable production in cities. The fourth section critiques the empirical evidence on different programmes' success or failure, taking England as an example on the basis that there are so many diverse programmes across many countries it is not practical to cover them all in this paper. The aim is to give a fair and balanced record of the economic and ecological merits of the EZs as they exist so far, in order to determine the benefits of applying EZ policy to accelerate sustainable production in cities. The final section compares and contrasts a number of types of cleaner production EZs. The goal is to highlight the variety of approaches to this new and cleaner production form of EZ and to further develop the concept of a progressive variation, the Ecological Empowerment and Enterprise Zone (EEEZ), setting out how the EEEZ would be a constructive response to existing strengths and weakness of EZ policy making.

2. Methodology

This paper distils the relevant latest findings from research which aims to test the hypothesis:

EZ policy can aid the transition to local sustainable development by contributing to socio-economic regeneration and the restoration of natural assets.

This research contributes to the body of literature focused on spatial low carbon enterprise strategy (Luque-Ayala and Marvin, 2015; Hodson and Marvin, 2012; Bulkeley *et al*, 2010). It is intended to contribute to knowledge management by assisting those in the policy community to develop city strategy that leads to cleaner production, economic development, and community involvement at a theoretical intersection of economic geography (Greenbaum and Engberg, 2004), industrial strategy (Lall, 2003), the utility of public sector intervention (Mazzucato, 2013), and steady state transition (Jackson, 2009).

This paper shares research insights related to i) a review of the literature on EZ policy origins and history, ii) a survey of cleaner production EZs in England. In distilling these initial insights, this paper sets out iii) a proposal for a new conceptual framework to develop a progressive form of EZ, the EEEZ.

The literature review critiques over 90 papers and data sources on EZs, urban regeneration, and industrial strategy published from the late 1970s to 2014. This period is deemed appropriate on the basis that is generally accepted that the modern version of the EZ emerged and grew rapidly from the late 1970s onwards (see for example Butler, 1981; Taylor, 1981; Greenbaum, 1998; Farole and Akinci, 2011).

The survey of cleaner production EZs is based on this international literature review and an online search of 24 EZs in England. The criteria for classification of a cleaner production EZ in the survey is that the particular EZ: co-located enterprise in a distinct geographical area; utilised a deregulatory regime; and displayed specific sustainability features. The research is not intended to focus on all forms of spatial low carbon strategy, of which there are many versions. This means, for instance, that many of the various Eco-Industrial Parks (EIPs) or Low Emission Zones are excluded from the list as they do not utilise a deregulatory incentive, e.g. the primary purpose of London's Low Emission Zone in England is the application of a congestion

charge for motorists to tackle air pollution and traffic delays as opposed to boost enterprise.

The proposal for a conceptual framework on an EEEZ is informed by the results of this literature review and survey. The EEEZ omits the features of failed EZ initiatives and includes the features of or ideas for successful ones (see for example Wilder and Ruben, 1996; Greenbaum and Landers, 2009; Cato, 2013; Monaghan, 2013).

3. Theoretical basis for EZ policy experimentation over three centuries

3.1 Origins and evolution of EZ theory

The strategy of concentrating or focussing economic development in particular places through ABIs has been around in different forms for centuries (Farole and Akinci, 2011). According to Farole and Akinci (2011), based on an ILO dataset (Boyenge, 2007), in 1986 there were reportedly 176 EZs in 47 countries, but by 2006 there were estimated to be over 3,500 EZs in 130 countries in the global north and south alike ranging from China and India to Mexico and the USA which accounted for more than \$200 billion in exports and directly employed at least 40 million workers.

The strategic intent of applying EZ policy appears to have varied over time owing to a specific challenge or local situation (Greenbaum and Landers, 2009; Mossberger, 2010; and Monaghan, 2013). This first wave emerged in the 1800s to secure shipping trade routes (realising the benefits of locational advantage). It resurfaced in a new wave during the 1970s as a deregulatory prescription to reverse inner city decline or regional unemployment (through which deregulation results in wealth creation that, advocates argued, would trickle down to those in need if business was allowed to flourish and was not artificially restricted). It evolved again in a new wave in the 2000s to accelerate green growth (one or both as a deregulatory solution to an environmental or social need and owing to the attraction of locational

advantage). It is important to note here, that one wave does not necessarily replace another, or that an EZ may be created or evolved to display characteristics of each type. Rather, it possibly represents a milestone in the experimentation or development of a unique form of EZ policy application, in different circumstances during different periods of time, as part of a wider economic reform strategy. The varying strategic intention of applying EZ policy also alerts us to the diversity of enterprise-focused ABIs, the unfocused use of 'enterprise' and 'empowerment' as spraycan words used to depoliticise ABIs and obscure their subjective policy origins, and to the need for conceptual clarity.

3.2. Contemporary EZs: Regenerating cities

Butler (1981), Taylor (1981), Greenbaum (1998), and Hirasuna and Michael (2005) all credit England with the idea for the modern version of the EZ in the late 1970s as a deregulatory tool to promote industrial rejuvenation through the establishment of ABIs characterised by deregulation. While it rejected the local socialist experiments of radical Labour councils of the 1980s, the then Conservative English Government was impressed by the rapid economic growth in the freeports of Asia (e.g. Hong Kong, Singapore). Consequently, seven EZs were created as a way to reverse the decline of English inner city areas by incentivising entrepreneurs to establish or expand businesses, create jobs and make environmental improvements by removing these areas from the control of the local authority (e.g. Isle of Dogs in London, Speke in Liverpool, and Salford Docks/Trafford Park in Manchester). These inner city areas suffered from pockets of severe deprivation and potency for civil disorder which was considered to be a consequence of the decline of old industries as markets and technologies changed, populations migrated and city finances failed (i.e. the flight of young skilled workers or the wealthy to the suburbs, leaving behind an older unskilled population or poor families, with less amenities). According to Taylor (1981), this implied a criticism of too much state intervention in the previous years, which was perceived to have

failed to break the 'cycle of deprivation' such as social policies to fund play parks or support racial integration.

Thus, the English Government's EZ policy programme which came into force through the Local Government Planning and Land Act 1980 and delivered through new UDCs was framed as an anti-interventionist market solution to inner city problems. Firms were to be 'freed' from state interference 'to make profits and create jobs' (Catalano, 1983:51) through exemptions from: tax liability (capital expenditure on buildings, development land, local authority business rates, customs warehousing duties for imported goods); elements of planning or pollution controls and employment protection and health and safety regulations (whereby developments conforming to the published scheme would not require planning permission, and exemption from training levies and a requirement to supply information to industrial training boards); and government statistics returns (reduction in reporting requirements).

The EZ idea flourished with the support of Chancellor Geoffrey Howe and the new Thatcher government through the 1980s. In total 38 EZs, Urban Development Corporations (UDCs), were designated between 1981 and 1986. According to Butler (1981) the EZ concept marked the 'greenlining' of inner cities as opposed to 'redlining', offering the potential to recreate the 'frontier' spirit of innovation which characterises great cities. In effect, a trickle-up approach to economic development, giving people more control over their lives, starting in modest employment before moving gradually up the ladder. Butler's idea is similar to what Porter (1990; 1997) describes as the inner city's comparative advantage.

This experiment of urban laissez-faire was intended to run for 10 years, but the limits of pure deregulation quickly became obvious as business began to recognise the value of engaging with the local community and the importance of government support to secure their profitability by providing investment in infrastructure (Mossberger, 2000; Page, 2005). This need was recognised more fully in the second wave of UDCs designated in the late 1980s (Fordham *et al*, 1999; Squires and Hall, 2013).

A decline in the popularity of EZs occurred during the 1990s and early new millennium. This was attributed to the effects of delays owing to European Commission State Aid regulations (House of Commons Library, 2014) and a shift in political preference for other forms of area based urban regeneration strategies which emphasised the importance of community empowerment, in particular under Blair's New Labour between 1997 and 2009 (Squires and Hall, 2013, Shaw and Robinson, 2009; Fordham *et al*, 1998; North, 2000).

With the election of the Coalition (Conservative/Liberal Democrat) Government in 2010, EZ policy once more became a popular economic instrument: as of 2015 there were 24 EZs with plans to create more across England (HM Government, 2014, 2015). Listed in Table 1 below, more than four fifths of these EZs have an explicit interest on exploiting some type of cleaner production with a declared sector focus on one or a combination of low carbon industry, green enterprise, energy, or construction including the built environment. These latest EZs were assigned by the Conservative Chancellor George Osborne to specific Local Enterprise Partnerships (LEPs) by appointment or a through competitive bidding process, although a couple were announced separately for the Humber and Lancashire in response to job losses announced by BAE Systems.¹

¹ LEPs are partnerships between local authorities and business, and were established as part of the Coalition Government's Plan for Growth on the basis that the private sector should play a greater role in regeneration.

Table 1 Sector focus of current wave of EZs in England

Enterprise Zone	Advanced engineering	Aerospace	Agrifood	Automotive	Business services	Chemicals	Cleaner production	Creative industries	Financial services	Hospitality and leisure	ICT	Industrial biotechnology	Pharma and healthcare	Retail and logistics	Security	Transport
Alconbury Campus (Cambridge)	•						•				•	•				
Birmingham	•				•				•		•		•			
Black Country	•	•		•			•									
Bristol Temple Quarter					•		•	•	•		•					
Discovery Park (Kent)			•		•		•					•	•			
Great Yarmouth and Lowestoft					•		•							•		
Harlow	•	•						•					•			
Hereford	•		•		•		•								•	
Humber			•				•							•		•
Lancashire	•	•		•												
Leeds City Region					•		•						•			
Manchester	•	•			•							•	•			
Mersey Waters (Liverpool)	•			•	•		•						•			
MIRA Technology Park (Leicester)	•			•			•				•					•
Newquay Aerohub	•	•					•									•
Northampton Waterside	•			•			•		•					•		
Nottingham and Derby	•						•	•				•	•			
North East	•			•			•									•
Royal Docks (London)					•		•	•		•						
Sci-Tech Daresbury (Cheshire)	•	•					•				•		•			
Science Value UK (Oxfordshire)	•	•					•				•		•			
Sheffield City Region	•	•					•	•					•			
Solent (Gosport, Hampshire)	•	•					•									
Tees Valley	•					•	•	•								
Percentage of EZs that focus on each sector	75	38	13	25	38	4	83	25	13	4	25	17	42	13	4	17

Source: Author's tabulation based on desktop search and literature review, 03 January 2015.

3.3 Accelerating a cleaner production form of rapid urbanisation

Global mega trends such as migration to cities, population growth, and addressing climate change and the associated concerns over resource scarcity, pollution, and standards of living (see for example Keller and Daly, 2007; Alcott, 2008; Satterwaite, 2009; Puppim de Oliveira, 2013) has led to what Heinberg (2011) argues is a fundamental turning point in human history

– ‘peak everything’ - resource depletion, environmental destruction, high unemployment and crushing levels of debt. There are two responses to this sustainability crisis: technologically innovating a way out, or developing a new circular, ecological economy which recognises fundamental resource constraints and limits on the planet’s ability to absorb wastes. In part as a way to crystallise these responses and the perceived prize of the transition to a green economy as the next big wave of capitalism, the past decade has seen a steady rise in interest amongst the policy community in experimenting again, this time with the so-called ‘ecological’, ‘green’, ‘low-carbon’ or ‘cleaner production’ EZs at the city or regional level (Chatham House et al, 2010; Wang et al, 2010; Farole and Akinci, 2011; Scott, 2012; Cato, 2013; Monaghan, 2013).

A business case cited for these cleaner production EZs is that the proximity of firms inside the zone can:

“facilitate the application of the environmental management principles of eco-efficiency and industrial ecology through information sharing, and provision of coordinated and centralized pollution prevention and management services and expertise” (Shah and Rivera, 2007: 269).

More than this, clustering for competitiveness (Porter, 1990; 1997) at the regional or sub-national level can best be captured within city centres², if well planned and compact/dense, thus aiding the transition to a green urban economy (Meijers, 2007; credit: UN-Habitat, 2012).

The context to the rise of this new wave of EZ experimentation is the influence of free market enthusiasts in the policy community ranging from the World Bank to Chatham House who promote it as a way to harness cleaner production to accelerate growth, instead of having to choose between cleaner production and growth. As Bowen and Fankhauser (2011) make the case, this green growth ‘narrative’ is attractive for strategic and analytical reasons:

² Although not all EZs are in city centres.

'strategic' because it is about opportunity and reward as opposed to problems and punishment; and 'analytical' because it is a paradigm shift from the marginal abatement cost of climate adaptation to broader economic policy that is about human ingenuity, jobs and creative destruction which appeals to various perspectives of economic thinking (e.g. Keynesian, Pigovian, and Schumpeterian). That is, those who contest the view that climate change is a threat to humanity's future may view sustainability as a constraint to development, and consequently either morally repugnant (given continued poverty) and impractical, or not the best use of money given limited resources (e.g. Lawson, 2008; Lomborg, 2001). Here the counter argument to a focus on avoiding dangerous climate change is that, for instance, to increase the proportion of poor people with access to drinking water the state should not try to limit growth, but make poor people richer through pro-poor, low carbon growth. That is, 'greening' growth is much more palatable to traditional economic thinkers than the notion of 'limiting' growth. Thus the sustainability or climate change debate should not be framed as consensual or 'post-political' (North 2010), it is deeply political with 'no cosy consensus'. It is also important to recognise the riposte by Cole (1973) of Meadows et al's (1972) 'limits to growth' ecological thesis; here Cole argues that Meadows et al's 'models of doom' are fundamentally flawed as, for instance, the system dynamics calculations for world scenarios fail to account for technological improvement in agricultural productivity driven by human ingenuity.

So, can some form of enterprise-focused ABI, be it of a deregulatory or empowering nature, facilitate technological change and drive the green economy in ways promoted by more optimistic scenarios by catalysing the development of new clean production technologies and processes?

As Table 1 (above) indicates, cleaner production EZs are already here and are a common phenomenon: in England four fifths of the 24 EZs in operation have an explicit interest in exploiting some type of cleaner production. Examples range from Sunderland's A19 ultra low carbon vehicle corridor (North East) through to Hull's green port with offshore energy (Humber).

The criteria for classification as a cleaner production EZ in the review is that the EZ: co-locates enterprise in a distinct geographical area; utilises a deregulatory regime; and displays specific cleaner production features. On the basis of research insights to date, the international literature review and English survey show that 'deregulatory incentives' include tax relief or grant in aid e.g. capital expenditure on buildings or land, local business rates, customs duties; removal of worker rights or environmental obligations; and planning simplification e.g. application, 24-hour set-up, help desk, reporting regime (see for example Catalano, 1983; Peterson, 2009; Squires and Hall, 2013). With regards to 'cleaner production characteristics', analysis also concludes this could include advanced standards for emissions or resource control e.g. energy, water, land, biodiversity, atmosphere, minerals; green technology or services e.g. electric vehicles, water stress, sustainable food, renewable energy, waste reduction, etc.; circular economy or steady state transition e.g. industrial symbiosis, ecological restoration, community resilience (Dennis, 1999; Cato, 2013; Monaghan, 2013). As noted earlier in Section 1.0, the research is to focus on all forms of spatial low carbon strategy, of which there are many versions. Again, this means, for instance, that many of the various EIPs or Low Emission Zones are excluded from the list as they do not utilise a deregulatory incentive.

Public officials appear to be applying cleaner production EZ policy at the city or regional level in a number of ways as one contribution to the acceleration of green development or growth (Chatham House et al, 2010; Faye, 2012; Cato, 2013; Monaghan, 2013). This policy application is in ways that are very much grounded in many varieties of economic theory. These range from attracting investment in sector clusters of new low-carbon technologies to diversify exports (i.e. re-design of extraction or production methods), through to introducing environmental controls to safeguard or mitigate the trade of traditional industries by discouraging fossil fuel use and enhancing resiliency of supply in energy, water or rare materials (i.e. reducing material input levels or end-pipe emissions). All of these types can and do exist within a single country (Section 5.1 develops a typology of cleaner production EZs, with supporting examples from England).

Such differentiation in the type of cleaner production EZ is important, as it reflects the merits of the different responses to the mitigation of dangerous anthropogenic climate change, be it to innovate a way out, or to develop a new circular economy (Dennis, 1999; Cato, 2013). In terms of the latter, Cato (2013) argues that experimentation with EZ policy is only a useful form of eco-modernisation if it can help to overcome the 'paradox of green growth' and achieve a Steady State Economy (SSE) of the kind envisaged by Daly (1978, 1996), Victor (2008) and Jackson (2009). The paradox referred to here is that, given the limited carrying capacity of the planet, green growth is an oxymoron if it relies on the relative decoupling of economic activity from the use of natural resources, as opposed to absolute decoupling (Lorek and Spangenberg, 2014; Perrels, 2007). This transition to a SSE is in terms of: positive contributions to capabilities for flourishing (e.g. a means to a livelihood, participation, security, a sense of belonging); provision of decent standards of living (within a constant population size); low material and energy throughput (that increase resource productivity); and fresh investment in ecological assets (i.e. diverting income to forestation, water infrastructure). Cato (2013: 23) makes the case for an Ecological Enterprise Zone as a post-growth policy which is applied in:

“areas where the resources to succeed are present, but which have not thrived in competition for financial investment”.

That is, hot beds for innovation in low carbon technologies and sustainable lifestyles, which replenish rather than deplete natural and societal assets. However, Dennis and Cato do not set out how this will assist community development or cite any examples of ecological EZs that have been, or are, in operation: this is a gap in our understanding.

4. Empirical evidence of EZ policy success

The hypothesis is, then, that the EZ model can catalyse the transition to local sustainable development. Is this the case? In answering this, the first question to be answered must be ‘have the different EZ programmes achieved their multiple objectives?’ If the answer is ‘yes’, the second question then is ‘does this type of state intervention represent better value for the public purse compared to other policy mechanisms?’. If again the answer is ‘yes’, we can proceed to an analysis of the extent that our hypothesis is valid.

4.1 First wave of English EZs during the 1980s

Data to support the argument for EZ policy, whilst compelling in different ways, is not entirely positive. In England, a number of studies argue that the evidence from the EZs designated during the 1980s paints a limited picture of success when it comes to the goal of generating growth. A government study which covered 22 of the 25 EZs designated between 1981 and 1984 found that 126,000 jobs were created and more than £2 billion of private capital was invested, yielding a public-to-private leverage ratio of about 1 to 2.3 (Department of Environment, 2005). The study listed four factors that appear to have influenced the relative performance of EZs: the comparative advantage or special character of an area; the nature of the sites assembled; the development strategy of the EZ authority; and the promotion and marketing arrangements for the EZ.

A number of subsequent reports by think-tanks such as the Work Foundation (Sissons and Brown, 2011) and the Centre for Cities (Larkin and Wilcox, 2011) have cast doubt on the success of these EZs however. Sissons and Brown argue that whilst by 1987 over 4,300 companies were located in 11 EZs, with an estimated 63,000 jobs created, 80% of these jobs had been displaced from other areas and often from within the same city; and of the new jobs created only around 25% were attributed to EZ designation. This amounted to a cost per job of between £23,000 and £45,000. The Isle of Dogs/ Canary Wharf EZ in London is highlighted as a success story however,

with the working population jumping from just 7,000 in 1993 to 90,000 by 2011. In this particular EZ, it is argued, the ease of planning regulations and infrastructure investment proved more significant than tax breaks. Consequently, Sissons and Brown conclude that EZs will only be part of the answer to long-term economic growth if they contribute to and have a sustained impact on innovation, trade, skills, infrastructure and entrepreneurship. Larkin and Wilcox (2011) draw similar conclusions to Sissons and Brown, but also argue that many of the benefits from these expensive EZs were captured by property owners rather than local areas. Robson (1998: 113) supports this point, for instance in the case of the Trafford/Salford EZ, it is estimated that 60% of the financial benefit of designation has gone to major private property owners and land developers. As a result, Sissons and Brown suggest that employment and skills support to increase productivity are a key component of successful EZs, which contrasts with the 1980s emphasis on capital spending and property development.

Reflecting on transferable lessons of previous experience, such as the US Federal Empowerment Zone and Enterprise Communities Program, Bondonio and Greenbaum (2006) recommend that within zone areas, greater attention should be paid to existing businesses, and find that two policy features have greater positive impacts on existing businesses: the requirement that incentives be tied to job creation and the requirement of a strategic local development plan. Erickson and Friedman (1990) also argue that if a city or state wishes to pursue EZ policies it should: focus on a small number of zones where it is likely that the intervention will have the most effect; explore the possibilities of more direct targeting of existing local development activities into the zones; and seek strong local participation. Wilder and Ruben (1996) also argue that better value for money could be achieved for an EZ by tying incentives to targeted training and hiring of zone residents or to continued investment by zone businesses. In relation to the role of EZ policy in the growth of export industries, Peterson (2009) also makes the case that EZ success can be aided by: flexibility and autonomy; a single-counter service (e.g. business permit approvals within 24 hours); aggressive incentive measures (e.g. lower tax exemptions for foreign investment compared to

domestic); an efficient infrastructure system (roads, ICT, water, energy, sewerage); and location (strategically developed near transports hubs to capture investments from neighbours). According to Eingereicht von Claus Knoth (2000) however, EZ policy by itself should not be relied upon as an instrument to solve the most pressing development problems, and that given high setup cost and sometimes limited direct economic benefit the greatest value of the EZ is acting as transient experimental areas to test ideas.

4.2 The current wave of English EZs

As a recent phenomenon there are few empirical studies of the impact of cleaner production EZs (Shah and Rivera, 2007; Tian et al, 2014). With a lifespan of 25 years, it is still early days for the current batch of 24 EZs, listed in Table 1 (above). The English Government (HM Government, 2015) argues that the EZs have already provided a major boost to the national economy, creating more than 15,500 jobs, attracting over 480 companies and drawing down £2 billion in private investment. This is in return for offering tax incentives, simplified planning and superfast broadband to companies.

Despite this, think-tanks and labour organisations such as the Centre for Cities and TUC (2011) also argue the 'jury is still out' on these EZs given concerns over the net economic benefit in terms of how long it takes to get these sites ready and how many of these jobs are displaced from elsewhere. For instance, the government has provided approximately £160m in infrastructure and capital grants to make the zones 'shovel ready' and is expected to forgo £95m in taxes until 2017 from incentives, yielding a total cost to the public purse of £255m. Yet the government also originally promised to create 54,000 jobs but reduced this pledge to 18,000 due to the slow uptake of businesses attracted into the zones (Rigby and Bounds, 2014).

This watering down of targets for jobs created in exchange for deregulatory incentives is significant in terms of value for money for the public purse. Whilst these EZs are not only about job creation, if cost-effectiveness is measured

purely on this basis, the authors estimate that at the current rate the cost per job created is high, at £14,167 per job for 18,000 jobs created relative to £4,722 per job for 54,000 jobs created. This compares unfavourably with other recent policy interventions (see for example TUC, 2011) such as the Future Jobs Fund at £6,500 per job created and the New Deal for Young People at £3,500 per job.

Perhaps there are more fundamental problems to be addressed. It has been suggested that there may be inherent contradictions for a cleaner production EZ or similar cluster between unabated growth and abated emissions (Monaghan, 2013; Davies, 2013). For example in the case of Baoding the economic boom from its solar panel industry means its carbon intensity – the amount of emissions per unit of GDP – appears to be higher than peer city equivalents (Wang et al, 2010; Su et al, 2012). That is, Baoding may actually be a high carbon EZ as opposed to a low carbon one on the basis that whilst it is manufacturing low carbon products it could be doing so in a carbon-intensive way. Baoding may not be alone in this regard, for instance, Sunderland's ultra-low carbon vehicle corridor may only result in a carbon positive outcome if it is part of a wider cleaner production transport strategy which decarbonises the national grid, discourages private car use and promotes public transport, reduces traffic congestion, and divests from supply chains reliant on Rare Earth materials (e.g. Terbium required for magnets in the motors of electric vehicles). Partly in recognition of this dilemma, a number of governments and international professional bodies are trying to recalibrate their approach to a green economy by piloting and establishing low carbon development standards which directly or indirectly impact on the design and operation of cleaner production EZs. Table 2 below highlights a number of these initiatives in England and worldwide. These standards may take the form of voluntary or mandated codes and guidelines which are specifically aimed at the governance of the EZ itself (e.g. Green SEZ Rating System in India) or which target a particular type of development/enterprise which may be located within an EZ (e.g. BREEAM in England).

Table 2 Rise of standards for cleaner production EZs

Standard/code/guideline	Demonstrable features relevant to zones
Implementing GHG Management Systems for EZs in China	Produced by IISD (2015), the report presents a conceptual framework for the development and implementation of a greenhouse gases (GHG) inventory system for EZs. For instance, alignment to China's carbon trading pilot program and development of monitoring, reporting and verification (MRV) systems including Greenhouse Gas Accounting and Reporting Guidelines for 10 Industries.
Green building certifications e.g. BREEAM (England); Environmental management systems for sites/ firms, e.g. ISO14001 (global); pollution charges, e.g. EU ETS	In England the Bristol Temple Quarter Enterprise Zone has set a number of sustainability design controls through BREEAM 'excellent' ratings for its buildings (Faye, 2012). Launched in 1990 by BRE, the Build Research Establishment Environmental Assessment Methodology (BREEAM) uses measures of performance related to energy and water use, the internal environment (health and well-being), pollution, transport, materials, waste, ecology and management processes.
IGBC Green SEZ Rating System (India)	The 2010 pilot version is an extension of the Green Special Enterprise Zone (SEZ) guidelines. The Indian Green Building Council and Ministry of Commerce & Industry prepared the Green SEZ guidelines in 2009 as a voluntary programme to facilitate the creation of energy efficient, water efficient, healthy, comfortable and environmentally friendly SEZs (IGBC, 2015). The rating programme uses well accepted national standards or appropriate international benchmarks, e.g. LEED.
Low Carbon Zones: A Practitioner's Handbook (World Bank Group)	Produced in 2014, the handbook is designed to aid practitioners in understanding Low Carbon Zones (LCZs) and the systematic process required to eventually develop and operate such zones. The primary focus is GHG emissions accounting rather than cleaner production per se. Developed by the World Bank Group (2014), it draws upon insights primarily from pilot work on low carbon Export Processing Zones in Bangladesh e.g. Chittagong.
Sustainable or smart city indicators e.g. ISO 37120 (global); BSI PAS 181 Smart City Framework (England)	ISO 37120 Sustainable Development of Communities: Indicators for City Services and Quality of Life is an ISO standard on city metrics. It is based on a set of 100 indicators across 17 themes which measure economic, social and environmental performance. It was developed and extensively tested by the Global City Indicators Facility, with verified cities including those which have a cleaner production EZ e.g. London's Royal Docks.

Source: Author's tabulation based on desktop search and literature review, 03 January 2015

At the same time, even when low emission controls are imposed, it may not always be conducive to furthering environment justice, for example, the health benefit to different socio-economic groups from traffic-related air pollution reduction (Cesaroni *et al.*, 2012).

It has also been suggested there may be limitations to what a city can do by itself when it comes to promoting low carbon development, with for instance UN-Habitat (2012) concluding that in the absence of a national strategy for cleaner production EZs, they may be inappropriately selected, non-

complimentary, fail to build trust and create unnecessary competition. For example as Table 1 shows, in England, more than four fifths of its current 24 EZs have an explicit focus on exploiting some form of cleaner production, ranging from electric vehicles to marine energy; and in 2015 the Communities Secretary proposed plans for a further wave of EZs, with new ones being proposed and some existing ones being expanded (HM Government, 2015). But without clarity on an English vision for national green growth which dovetails with local development plans for sector specialisation it is unclear whether this is gold dust or fool's gold.

4.3 The role of policy transfer and learning

Given the apparent gap between the rhetoric and conclusive evidence of EZ programme success, it is helpful to understand theories of how public policy is produced more widely, is transferred and mutated, and then to cross-tabulate this understanding with the knowledge of how EZ policy has been produced.

In an examination of the origins of policy Page (2005: 205) argues that ideas are:

“shaped by a vast array of different environmental circumstances, ranging from an immediate specific cue or impetus to a more general spirit of the time or even a belief in a self-evident universal truth.”

McCann and Ward (2013) also argue that policy transfer needs to be understood in terms of policy assemblages, mobilities and mutations. The authors make the case that there are a number of actors involved in circulating or marketing potential policy products globally: law-makers themselves, but also political parties, think-tanks, consultants, industry trade associations and NGOs. A competition for influence, investment and resources compels these actors to shape new innovative policy solutions quickly and cheaply, motivating them to adopt and change models from elsewhere.

In the context of the production and transfer of EZ policy, Page cites Mossberger's (2000) study of the adoption of English-style policy in the USA as an example of cross-national policy borrowing to emphasise the importance of the role of principles or broad 'labels' in the spread of a policy idea, as opposed to detailed measures to be implemented. As suggested in section 3.1 above, this resulted in 'enterprise' and 'empowerment' being spraycan words used interchangeably with little regard to content. Mossberger argues that England's idea for EZs was to remove regulatory and tax burdens to encourage firms to locate or invest in a particular area, which was in turn inspired by the idea of Hong Kong and Singapore's freeports. As noted in section 3.2 earlier, what actually emerged in England according to Mossberger was limited liberalisation, due to business concerns about the need to engage communities and for public infrastructure investment.

The critiques by Page and Mossberger and others of how ideas spread or are undermined sit well with examinations of other economic development policies. For instance, Mukhtarov (2014) and Thorpe (1973) in relation to the water and cotton mills industries respectively.

Greenbaum and Landers' (2009) analysis examines two explanations for why state policy makers are still proponents of EZs despite their mixed track record. One explanation is that academic research has not been made accessible enough to policy makers. A second explanation is that political decision-making that shapes EZ programmes is influenced by many actors and sources of information. Greenbaum and Landers conclude that the establishment or expansion of EZs may be strongly influenced by lobbying from businesses and landlords engaging in rent seeking behaviour (i.e. reducing the tax component of their operating costs, increasing land value capture, etc.) to take advantage of local political pressure to create jobs in unemployed areas. Greenbaum and Landers' argue that policy makers may not engage with academic literature that they do not think is relevant. To make the research more relevant requires ensuring it is more timely, compares and contrasts the varied research to distil findings, and makes

recommendations for policy changes based on impact estimates in relation to designation criteria, targeting, marketing, management or incentive policies.

5. Developing the concept of an Ecological Empowerment and Enterprise Zone

5.1 Typology of cleaner production EZs

Given the gap identified between rhetoric and reality it is necessary to develop the concept of the Ecological Enterprise Zone referred to by Dennis (1999) and Cato (2013). This can best be done by devising a typology to compare and contrast the sustainability characteristics displayed by different cleaner production EZs, pulling out their best attributes, and losing those which evaluation suggests are less effective. This is also helpful as different EZs or city descriptors can use an 'eco' type prefix, which may be commonly used in different ways (see for example Joss et al, 2011; Glavic and Lukman, 2007). As illustrated in Table 3, the authors develop a triple typology of cleaner production EZ, using England as an example. The first type is one which focuses on advanced standards for control of material throughputs at the planning or operational stage (eg Bristol's Temple Quarter application of BREEAM for its mixed retail development). The goal of the second type of EZ is the manufacture and export of technologies to trade in the global market for low carbon goods and services (eg Sunderland's low-carbon car manufacturing plant). The third type of EZ is one which is based on a need to trade in a manner which restores depleted assets through ecological regeneration and community capacity building (eg Somerset's eco-tourist site).

Table 3 Cleaner production EZs in England displaying different sustainability characteristics

Type of cleaner production	Example of city or regional EZ
i) Advanced standards for emissions or resource control (e.g. energy, water, land, biodiversity, atmosphere, minerals)	Bristol's Temple Quarter Enterprise Zone is a 70 ha mixed retail development containing new or refurbished space, featuring offices, research and development space, homes and retail units, an arena and a redeveloped railway station (Bristol Temple Quarter Enterprise Zone, 2015). Over 350 firms such as IBM and HSBC are already in the zone and the target is to create 4,500 jobs. Through arrangements agreed in its City Deal, Bristol's vision includes delivering this as a 'carbon neutral or carbon positive' development through sustainability design controls such as BREEAM (Faye, 2012).
ii) Trade in green technology or services (e.g. electric vehicles, water stress, sustainable food, renewable energy, waste reduction)	The North East Enterprise Zone covers 115 ha of land bringing together clusters of businesses within the automotive, offshore, and renewables sectors, which together employ over 1,200 people (North East Enterprise Zone, 2015). It includes the city of Sunderland's designation as an Ultra Low Carbon Vehicle Corridor, the supply chain for which is forecast to be worth up to £1 billion in the region, and already 430 companies focus on alternatively-fuelled vehicles such as production of the flagship Nissan Leaf car (The Environmentalist, 2012).
iii) Steady state transition (e.g. ecological restoration, industrial symbiosis, community resilience)	Somerset's Perfect Brue is a proposed Ecological Enterprise Zone to be located in Brue Valley, a rich, yet sensitive, wildlife area (Somerset Local Nature Partnership, 2014). The plan is to harness this special environment to create green jobs by generating biomass for energy, promoting eco-tourism, and managing blue infrastructure to reduce flood risks. A key goal is to double the area managed as nature-rich wetland.

Source: Author's tabulation based on desktop search and literature review, 03 January 2015

The dominance of the entrepreneurial thesis suggests that the only form of EZ is the deregulatory version, but this survey shows that there are others.

This categorisation does not mean one EZ is independent of or always superior to another. The same EZ may display one or more features. It may also be necessary for there to be a short-term increase in emissions or material throughput within an EZ to achieve a long-term decrease for the city or nation: for instance, fossil-fuelled factories which manufacture the equipment required to install a decarbonised grid, and then are subsequently decommissioned. This is akin to what Perrels (2007) argues is the search for the best feasible trajectory for sustainable consumption and production, which may 'waver' between the radical and the realistic.

5.2 Towards an activist state-led transition to an inclusive and cleaner economy

To be an Ecological Empowerment and Enterprise Zone (EEEZ), it is argued here that the zone must display the sustainability characteristics of the third type. The EEEZ concept combines and builds on policy features of the US Federal Empowerment Zone and Enterprise Communities Program and the idea of an Ecological Enterprise Zone advocated by Dennis and Cato by ensuring that EEEZs aid the transition to a SSE in a manner that will empower communities. This is an important point as Bost (2011: 9) argues that “social issues remain the Achilles’ heel for many firms” operating in zones. For instance according to Bost, attacks on workers’ rights can be routine; a problem reflected in the fact that the turnover rate among workers in the firms concerned is high despite their being paid comparatively more than their counterparts. Yet, it is also argued that EZs can result in social mobility for women, reducing poverty and boosting equality (Bhagwati, 2007). In part in recognition of this dilemma, rather than focusing solely on deregulation, like in England, the US government EZ regime which was passed as legislation in 1993 is focused on giving local residents more control over community development in zones through the Federal Empowerment Zone and Enterprise Community Program (Wilder and Ruben, 2007). Design of the Empowerment Zones policy was informed by the adverse experiences of the 1960s Federal Model Cities program, which, like the UDCs in England, was “criticised for its top down approach to community participation” (Squires and Hall, 2013: 82).

The authors argue that ‘freeing business to innovate’ can be through the removal of unhelpful forms of regulation (for example, eradicating the need for licenses and permits that are obviously tools for rent seeking, as opposed to maintaining high standards of innovation), not at the cost of labour or environmental standards. In return for these deregulatory incentives, businesses located within the EEEZ would be required to focus on what a bounded economy needs to deliver (Jackson, 2009).

Thus the EEEZ is intended to be different from other cleaner production EZs and wider forms of ABIs, in particular because it is not necessarily deregulatory in terms of arguing that progress is made when the state gets off the back of entrepreneurs. By doing so it grounds the concept in the broader 'state-business-society' discussion relating to cities as agents in global climate change and eco-modernisation more generally. Here, alongside focused support for low carbon businesses, niche innovation by communities such as Transition Towns of the kind described by Seyfang and Smith (2007) also plays a pivotal role, catalysing community engagement with sustainability action. The transition to a sustainable economy is not just through experimentation by 'heroic' industrialists: communities also innovate, and this can also be catalysed through ABIs to support nodes where such community-based 'ecopreneurs' congregate (North and Longhurst 2013; Gibbs and O'Neil, forthcoming).

The approach to developing a socially equitable, state led transition to a low carbon economy is perhaps best aligned to a political economy concept which values the contribution of the private market to industrial development but also recognises the role of the state to act as a manager or facilitator rather than a controller of an economy (Lall, 1992 and 2003; Gereffit et al, 2001; Westphal, 2002; Wood, 2003).

Applying this approach to the EEEZ concept involves selective interventions in overcoming the market and institutional failures necessary to build the capabilities required to facilitate the transition to an inclusive and low carbon economy. In doing so, however, an important consideration is not just the mode in which the state, business or society intervene, but also at what stage. There is transferable lessons learned from EIPs here. For instance, citing case studies from Chinese EIPs in Suzhou and Tianjin, Yu et al (2013, 2015) identify at what stage strong steering or a more facilitative role by the state were conducive to economic and ecological success, and under what conditions no, relative or even absolute decoupling of economic growth from the use of natural resources took place. Given this, what are the key stages in

the innovation or investment cycle where the state can intervene to promote the EEEZ concept?

Innovations such as breakthrough technology is considered a key contributor to stronger GDP as it can provide a comparative advantage in high-tech sectors by allowing capital and labour to be used more productively over time, which can attract more investment and potentially boost. It is also argued however that whilst R&D spending and trade is necessary for sustained industrial development, it may be unproductive or not sufficient. Only the fastest growing firms in a period of the life-cycle when competition is most fierce tend to reap the rewards from R&D, and an absence of complimentary assets at the firm level such as infrastructure or marketing capabilities can mean R&D becomes redundant (Mazzucato, 2013; Lall, 2003). An absence of trade restrictions and taxes can also render infant industries uncompetitive against more established rivals, or result in wealth reduction for the most disadvantaged in society if the developing country does not have welfare or educational infrastructure to cope (Stiglitz and Charlton, 2005; Kozul-Wright and Rayment, 2007).

To better capture the benefits of international trade and ensure imperfect markets are not welfare-reducing, Chang (2002, 2008) and Stiglitz and Charlton (2005) argue that awareness of and assistance with the costs of adjustment is required, ranging from easing supply constraints (finance, technical assistance) to developing consensus on product standards.

Mazzucato (2013) also argues however that a failing of political economists such as Chang (2008) is that they perceive the role of the state in promoting development as assistance to a catching up process, which wrongly views the state as a 'passive entrepreneur of last resort'. As part of debunking public sector versus private sector myths, instead the author makes the case that "the state does not 'de-risk'... it takes on risks, shaping and creating new markets" (2013: 9). In such an instance, the state is an entrepreneur of 'first resort'. To support this point, examples are cited from the US pharmaceuticals and ICT sectors, where most revolutionary new drugs or the iPhone are

developed mostly with public funds. More than this, says Mazzucato, private sector funds then ‘surf the wave’ created by the public sector. Mazzucato (2013) makes the point however that there is a big difference between the state taking a back seat and simply subsidising or incentivising investments. Compared to, for instance, the role of state development banks in providing a form of ‘patient finance’ (2013: 157) and high risk funding to give an initial push to winning industries, such as trade nurtured in wind turbines and solar power in China (e.g. SunTech Power), Denmark (e.g. Vesta), Germany and the USA (e.g. Kenetech). This is as part of a wider enabling public policy environment to help infant industries to flourish, which includes instruments such as feed in tariffs, greenhouse reduction targets, and carbon taxes. According to Mazzucato, what separates China from the rest is its much longer-term commitment, noting the US’s withdrawal of support for renewable energy in the 1980s. China’s ongoing support for firms has led to the downside risk of ‘trade wars’ (2013: 149), for instance, ‘local content rules’ for the supply chain of Foreign Director Investors such as Goldwind (70% local content in all turbines). Another upside however, in addition to a jobs push, has been the systemic ‘green benefits to this intervention’, for example, the C-Sti technology is a move away from China/sector reliance on Rare Earths in the supply chain (2013: 157).

5.3 Capturing shared value from the state as a risk taker

The risk-reward relationship is key to realising the direct/indirect return to the economy and state from public support (Mazzucato, 2013). Innovation tends to reduce inequality when the distribution of financial rewards for the innovation process reflects the distribution of contributions to the innovation process. Yet the state does not earn a return for its investments indirectly via taxation as the system was not conceived to support innovation and because tax evasion is a concern. An example of the state getting this risk-reward nexus wrong is Apple, says Mazzucato. It is argued that Apple is often wrongly used to laud the power of the market and Schumpeterian creative destruction. That is, the process by which innovation changes the status quo

to allow the market shares of firms that introduce new goods to grow, at the expense of failing firms who resist this change.

According to Mazzucato, prior to Apple's IPO in 1980 it received \$0.5 million early stage equity investment by the Illinois small business investment company. When formed to sell its personal computer (PC), the technology was based on breakthroughs achieved through public-private partnerships established by government and the military during between 1960 and 1970s for silicon in semiconductors which meant PCs could be affordable for mass consumer market. Mazzucato concludes that the solution is a 'golden share of IPR' for the state investor, with royalties going to a national innovation fund and development banks. Successful examples cited include the China CDB £3 billion investment in Argentine wind which includes the involvement of Chinese companies in the supply chain; Brazil BNDES' 21% Return on Equity investment in clean and biotechnology; and Finland's SITRA support for Nokia (Mazzucato, 2013). By comparison, says Mazzucato, the US and England do not do this "for 'fear'... the next step is communism" (2013: 190).

Based on these transferable insights, the EEEZ concept also proposes in return from deregulatory incentives that businesses located in the zone are required to negotiate shared value capture deals in return for infant industry support. These deals go beyond local content requirements, to include fair corporate tax payment, and golden shares of IPR which is recycled locally on patient finance via regional development banks or supports adjustment costs.

6. Conclusion

To inform the contribution of low carbon spatial strategy to the sustainable cities agenda, this paper has set out to test the hypothesis that EZ policy can aid the transition to local sustainable development. Taking England as one example, there appears to be limited evidence to support the case for the blanket application of EZs in their laissez-faire, deregulated form. Whilst there is empirical evidence to suggest that different versions of EZs and other ABIs

do contribute to growth or regeneration, for example in the Isle of Dogs/ Canary Wharf (London), a distillation of various studies finds the rationale for EZ policy over other types of economic instrument to be inconclusive given that there are examples of failure too. On this basis, the hypothesis is rejected.

Despite the inconsistent record of previous EZ regimes, a survey of English EZs by the authors suggests that a new and cleaner production form of EZs have emerged to support the transition to sustainable cities and are on the rise: in England over four fifths of the 24 EZs in operation have an explicit interest in exploiting some type of cleaner production. A business case cited for these cleaner production EZs is that the proximity of firms inside the zone can facilitate the application of principles of eco-efficiency and industrial ecology through information sharing and provision of centralised pollution prevention expertise.

Heeding the lessons from the past and developing ideas going forward, it is argued here that for the hypothesis to possibly be sustained in the future and represent good value for money for the public purse, policymakers need to better understand the intersection and application of state and market-mechanisms, niche innovation, economic geography, and ecology. This means paying more attention to developing the concept of an EEEZ which combines and builds on policy features of the US Federal Empowerment Zone and Enterprise Communities Program and the idea of an ecological EZ advocated by Dennis and Cato, and develops the notion of the activist state by Mazzucato which recognises the valuable role of the public sector as an entrepreneur of first resort and a provider of patient finance.

The EEEZ will more likely flourish with three enabling factors. First, bringing the state back in through the establishment of a national industrial strategy which ensures city competitiveness plans in relation to low carbon goods and services are specialised and complimentary, thus avoiding market confusion and duplication. Second, bringing cleaner production back in through the adoption of a holistic approach to urban planning which is ecologically

regenerative as well as well circular, so that economic activity in cities both restores natural assets and lowers material intensity. Third, bringing social inclusion back in through the placement of requirements on businesses located within the zones to recruit and develop the local workforce, support community development and safeguard the local environment in return for deregulatory incentives so that the benefits of social mobility are for the long-term and dovetail with wider city regeneration strategy.

References

- Alcott, B., 2008. The sufficiency strategy: would rich-world frugality lower environmental impact. *Ecological Economics*, 64: 770-786.
- Bailey, N. Barker, A. and MacDonald, K., 1995. *Partnership Agencies in British Urban Policy*. UCL Press: London.
- Bhagwati, J., 2004. *In Defence of Globalisation*. Oxford University Press, Oxford.
- Bilings, S., 2009. Do Enterprise Zones work? An analysis at the borders. *Public Finance Review*, 37: 68-93.
- Bondonio, D. and Engberg. J., 2000. Enterprise zones and local employment: evidence from the States' programs. *Regional Science and Urban Economics*, 30: 519-549.
- Bondonio, D. and R.T. Greenbaum, 2007. Do Tax Incentives Affect Local Economic Growth? What Mean Impacts Miss in the Analysis of Enterprise Zone Policies. *Regional Science and Urban Economics*, 37(1): 121-136.
- Bondonio, D. and R.T. Greenbaum, 2014. Revitalizing Regional Economies through Enterprise Support Policies: An Impact Evaluation of Multiple Instruments. *European Urban and Regional Studies*, 21(1): 79-103.
- Bost, F., 2011. *West African Challenges: Are Economic Free Zones Good for Development?* OECD, Paris.
- Bowen, A. and Frankhauser, A. 2011. The green growth narrative. *Global Environmental Change*, 21: 1157-1159.
- Boyenge, J., S., 2007. *ILO database on export processing zones*. ILO, Geneva.
- Bristol Temple Quarter Enterprise Zone, 2015. Available from <http://www.bristoltemplequarter.com/about-the-zone> (accessed 03 January 2015)
- Bulkeley, H.A., Castan Broto, V., Hodson, M. & Marvin, S., 2010. *Cities and Low Carbon Transitions*. Routledge, London.
- Butler, S.M., 1981. *Enterprise Zones: Greenlining the Inner Cities*. Heinemann, London.

- Catalano, A., 1983. A Review of UK Enterprise Zones, CES Paper 17. CES, London.
- Cesaroni, G., Boogaard, H., Jonkers, S., Porta, D., Badaloni, C., Cattani, G., Forastiere, F. and Hoek, G., 2012. Health Benefit of Traffic-Related Air Pollution Reduction in Different Socio-Economic Groups: the effect of Low Emission Zoning in Rome. *Occupational and Environmental Medicine*, 69: 133-139.
- Cato, M.S., 2013. The Paradox of Green Keynesianism. Green House, London.
- Chang, H., 2002. Kicking Away the Development Ladder. Anthem Press, London.
- Chang, H., 2008. Bad Samaritans. Random House, London.
- Chatham House, Chinese Academy of Sciences, Energy Research Institute, Jilin University and 3G, 2010. Low Carbon Development Road Map for Jilin City. Chatham House, London.
- Cole, H.S.D., 1973. The structure of the world models. *Futures*, February: 14-32.
- Creswell, J., 2009. Research Design: Qualitative, Quantitative and Mixed Methods Approaches. Sage, Thousand Oaks.
- Daly, H.E., 1996. Beyond Growth. Beacon Press, Boston.
- Daly, H.E., 1978. Steady State Economics: Biophysical Equilibrium and Moral Growth. W.H.Freeman & Co Ltd, Boston.
- Davies, A.R., 2013. Cleantech clusters: Transformational assemblages for a just, green economy or just business as usual? *Global Environmental Change*, 23: 1285–1295.
- Dennis, M., 1999. Statement of Vice President and General Counsel, The Nature Conservancy Testimony before the US Subcommittee on Oversight of the House Committee on Ways and Means. Hearing on the Impact of Tax Law on Land Use, Conservation, and Preservation. September 30, 1999.
- Department of Environment, 1995. Final Evaluation of Enterprise Zones. London, DoE.

- Erickson, R.A. and Friedman, S.W., 1990. Enterprise zones: 2. A comparative analysis of zone performance and state government policies. *Environment and Planning C: Government and Policy*, 8: 363-378.
- Farole, T. and Akinci, G., 2011. *Special Enterprise Zones: Progress, Emerging Challenges and Future Directions*. World Bank Group, Washington DC.
- Fordham, G., Hutchinson, J. and Foley, P., 1999. Strategic Approaches to Local Regeneration: The Single Regeneration Budget Fund. *Regional Studies*, 33(2): 131-141.
- Gereffi, G., Humphrey, J., Kaplinsky, R. and Sturgeon, T. J., 2001. Introduction: Globalisation, value chains and development. *IDS Bulletin*, Institute of Development Studies, Sussex, 32(2): 1-8.
- Gibbs, D and O'Neill, K, forthcoming. Rethinking socio-technical transitions and green entrepreneurship: the potential for transformative change in the green building sector. *Environment and Planning A*.
- Glavic, P. and Lukman, R., 2007. Review of sustainability terms and their definitions. *Journal of Cleaner Production*, 15: 1875-1885.
- Greenbaum, R.T., 1998. *An Evaluation of State Enterprise Zone Policies: Measuring the Impact on Business Decisions and Housing Market Outcomes*. PhD thesis. Carnegie Mellon University.
- Greenbaum, R.T. and Engberg, J.B., 2004. The Impact of State Enterprise Zones on Urban Manufacturing Establishments. *Journal of Policy Analysis and Management*, 23(2): 315-39.
- Greenbaum, R.T. and Landers, J. 2009. Why are State Policy Makers Still Proponents of Enterprise Zones? What Explains Their Action in the Face of a Preponderance of the Research? *International Regional Science Review*, 32(4): 466-479.
- Harvey, D., 1989. From Managerialism to Entrepreneurialism: The Transformation in Urban Governance in Late Capitalism. *Human Geography*, 71(1): 3-17.
- Heinberg, R., 2011. *The End of Growth: Adapting to Our New Economic Reality*. Clairview, Forest Row.

- Hirasuna, D. and Michael, J., 2005. Enterprise Zones: A review of the economic theory and empirical evidence. A policy brief by the research department of the Minnesota House of Representatives.
- HM Government, 2014. Enterprise zones: looking for a place to grow your business. Available from <http://enterprisezones.communities.gov.uk/about-enterprise-zones/> (accessed 01 December 2014).
- HM Government, 2015. Boost for business as Government backs new Enterprise Zones. Available from <http://enterprisezones.communities.gov.uk/boost-business-government-backs-enterprise-zones/> (accessed 03 January 2015).
- Hodson, M. & Marvin, S., 2012. Mediating Low-Carbon Urban Transitions? Forms of Organization, Knowledge and Action. *European Planning Studies* 20(3): 421-439.
- House of Commons Library, 2014. Enterprise Zones. House of Commons Library, London.
- IFC, 2014. Low Carbon Zones: A Practitioner's Handbook. World Bank Group: Washington DC.
- IGBC, 2015. Green SEZ Rating System (Pilot Version). Available from <https://igbc.in/igbc/redirectHtml.htm?redVal=showGreenSEZnosign> (accessed 03 January 2015).
- Jackson, T., 2009. Prosperity without Growth: Economics for a Finite Planet. Earthscan, London.
- Joss, S., Tomozeiu, D., Cowley, R., 2011. Eco-Cities – A Global Survey 2011, International Eco-Cities Initiative. University of Westminster, London.
- Keller, E., A., Day Jr., J.W., 2007. Untrammled growth as an environmental "March of Folly". *Ecological Engineering*, 30: 206-214.
- Kozul-Wright, R., and Rayment, P., 2007. The Resistible Rise of Market Fundamentalism. Zed Books, London.
- Lall, S., 1992. Technological capabilities and industrialization. *World Development*, 20(2): 165-86.
- Lall, S., 2003. Reinvesting industrial strategy: the role of government policy in building industrial competitiveness. ODID Working Paper Series, 111: 1-35.

- Larkin, K. and Wilcox, Z., 2011. What would Maggie do? Why the Government's policy on enterprise zones needs to be radically different to the failed policy of the 1980s. Centre for Cities, London.
- Lawson, N. 2008. An appeal to reason: a cool look at global warming. Duckworth Overlook, London.
- Lomborg, B. 2001. The Sceptical Environmentalist. Cambridge University Press, Cambridge.
- Lorek, S. and Spangenberg, J.H., 2014. Sustainable consumption within a sustainable economy – beyond green growth and green economies. Cleaner Production Journal, 63: 33–44.
- Luque-Ayala, A. & Marvin, S., 2015. Developing a Critical Understanding of Smart Urbanism?. Urban Studies 52(12): 2105-2116.
- Mazzucato, M, 2013. The Entrepreneurial State. Anthem Press, London.
- McCann, E. and Ward, K., 2013. A multi-disciplinary approach to policy transfer research: geographies, assemblages, mobilities and mutations. Policy Studies, 34(1): 2-18.
- Meadows, D.H., Meadows, D.L., Randers, J., Behrens III, W.W., 1972. The Limits to Growth. Universal Books, New York.
- Meijers, E., 2007. Synergy in Polycentric Urban Regions Complementarity, Organising Capacity and Critical Mass. PhD thesis. Delft University.
- Monaghan, P., 2013. Low carbon enterprise zones: towards a fossil fuel free economy, in The Green Economy of Cities: A World Compendium on the Green Urban Economy, 3(1), eds. Simpson, R., Otto-Zimmerman, K. Springer, Freiburg.
- Mossberger, K., 2000. The Politics of Ideas and Spread of Enterprise Zones. Georgetown University Press, Washington.
- Mukhtarov, F., 2014. Rethinking the travel of ideas: policy translation in the water sector. Policy and Politics, 42 (1): 71-88.
- North East Enterprise Zone, 2015. Available from <http://nelep.co.uk/enterprise-zone> (accessed 03 January 2015).
- North, P., 2000. Is there space for organisation from below within the UK Government's Action Zones?: a test of 'collaborative planning.'. Urban Studies, 37: 1261-1278.

- North, P., 2010. Eco-localisation as a progressive response to peak oil and climate change – a sympathetic critique. *Geoforum*, 3: 585-594.
- North, P., 2011. Geographies and utopias of Cameron's Big Society'. *Social & Cultural Geography*, 12: 817-827.
- North, P. and Longhurst, N., 2013. Grassroots Localisation? The Scalar Potential of and Limits of the 'Transition' Approach to Climate Change and Resource Constraint. *Urban Studies*, 50: 1423-1438.
- Office of the Deputy Prime Minister, 1995. Final Evaluation of Enterprise Zones. Office of the Deputy Prime Minister, London.
- Page, E.C., 2005. The Origins of Policy. *The Oxford Handbook of Public Policy*, 205-224.
- Perrels, A., 2007. Wavering between radical and realistic sustainable consumption policies: in search for the best feasible trajectories. *Journal of Cleaner Production*, 16: 1203-1217.
- Peterson, E., 2009. Unlocking Land Values to Finance Infrastructure. World Bank Group, Washington DC.
- Porter, M.E., 1990. *The Competitive Advantage of Nations*. MacMillan, London.
- Porter, M.E., 1997. New Strategies for Inner-City Economic Development. *Economic Development Quarterly*, 11: 1.
- Puppim de Oliveira, J. A., et al, 2013. Green economy and governance in cities: assessing good governance in key urban economic processes. *Journal of Cleaner Production*, 58: 138-152.
- Rigby, E. and Bounds, A., 2014. Second wave of UK enterprise zones planned. *Financial Times*, 11 November 2014.
- Robson, B., 1988. *Those Inner Cities: Reconciling the Economic and Social Aims of Urban Policy*. Clarendon Press, Oxford.
- Satterthwaite, D., 2009. The Implications of Population Growth and Urbanization for Climate Change'. *Environment & Urbanization*, 21 (2), 545-567.
- Scott, F., 2012. *Green Cities: Using Low Carbon Deals to Drive City Growth*. Green Alliance, London.

- Seyfang, G. and Smith, A., 2007. Grassroots innovations for sustainable development: Towards a new research and policy agenda. *Environmental Politics*, 16(4): 584-603.
- Shah, K.U., and Rivera, J.E., 2007. Export processing zones and corporate environmental performance in emerging economies: The case of the oil, gas, and chemical sectors of Trinidad and Tobago. *Policy Sciences*, 40: 265-285.
- Shaw, K. and Robinson, F., 2010. UK urban regeneration policies in the early 21st Century: continuity or change?. *Town Planning Review*, 81(2): 123-150.
- Sissons, A. and Brown, C., 2011. *Do Enterprise Zones Work?* The Work Foundation, London.
- Somerset Local Nature Partnership, 2014. *Naturally Somerset*. Somerset Local Nature Partnership, Somerset.
- Squires, G. and Hall, S., 2013. Lessons (un)learning in spatially targeted fiscal incentive policy: Enterprise Zones (England) and Empowerment Zones (United States). *Land Use Policy*, 33: 81-89.
- Stiglitz, J.E., and Charlton, A., 2015. *Fair Trade for All*. Oxford University Press, Oxford.
- Su, M., Liang, C., Chen, B., Chen, S., Yang, Z., 2012. Low-carbon development patterns: observations of Chinese cities. *Energies*, 5: 291-304.
- Taylor, S., 1981. The politics of enterprise zones. *Public Administration*, 59: 421-439.
- The Environmentalist, 2012. North east flies higher. *The Environmentalist*, November 2012: 14-16.
- Tian, J., Liu, W., Lai, B., Li, X., & Chen, L., 2014. Study of the performance of eco-industrial park development in China. *Journal of Cleaner Production*, 64: 486–494.
- TUC, 2011. Are Enterprise Zones the answer? Will they create additional jobs at the levels desired? <http://touchstoneblog.org.uk/2011/05/are-enterprise-zones-the-answer-will-they-create-additional-jobs-at-the-levels-desired/> (accessed 3 January 2015)

- UN-Habitat, 2012. Urban Patterns for an Urban Economy: Clustering for Competitiveness. UN-Habitat, Nairobi.
- Victor, P.A., 2008. Managing Without Growth: Slower by Design, Not Disaster. Edward Elgar Publishing, Cheltenham.
- von Claus Knoth, E., 2000. Special Economic Zones and Economic Transformation: The Case of the People's Republic of China. PhD thesis. Konstanz University.
- Wang, T., Zhang, Z., Wu, J., 2010. Towards Low Carbon Cities of China's SEZs – The Case of Shenzhen. Chinese Academy of Sciences, Lanzhou.
- Westphal, L., 2002. Technology strategies for economic development in a fast changing global economy. *Economics of Innovation and New Technology*, 11, 275-320.
- Wilder, M.G. and Rubin, B.M., 1996. Rhetoric versus reality: a review on studies of State Enterprise Zone programs. *Journal of America Planning Association*, 62(4): 473-491.
- Wood, A. (ed.), 2003. Symposium on infant industries. *Oxford Development Studies*, 31(1): 3-20.
- World Bank Group, 2014. Low Carbon Zones: A Practitioner's Handbook. World Bank Group, Washington, DC.
- Yu, C., de Jong, M., Dijkema, G.P.J, 2013. Process analysis of eco-industrial park development – the case of Tianjin, China. *Journal of Cleaner Production*, 64: 464-477.
- Yu, C., Dijkema, G.P.J, de Jong, M., Shi, H., 2015. From an eco-industrial park towards an eco-city: a case study in Suzhou, China. *Journal of Cleaner Production*, 102: 264-274.